SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS81934

REV. A

Issued 1998-04
Revised 2005-02

Superseding AS81934

(R) Bearings, Sleeve, Plain and Flanged, Self-Lubricating

NOTICE

This document includes cadmium as a plating material. The use of cadmium has been restricted and/or banned for use in many countries due to environmental and health concerns. The user should consult with local officials on applicable health and environmental regulations regarding its use.

Under Department of Defense (DoD) Policies and Procedures, any qualification requirements and associated Qualified Products Lists (QPLs) are mandatory for DoD contracts. Any material relating to QPLs have not been adopted by SAE and are not part of this SAE technical document.

1. SCOPE:

1.1 Scope:

This standard covers plain and flanged sleeve bearings which are self-lubricating by incorporating polytetrafluoroethylene (PTFE) in a liner in the bore for use in the temperature range of -65 to +325 °F (-54 to +163 °C).

2. APPLICABLE DOCUMENTS:

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable isue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
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2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS8243	Anti-Icing and Deicing - Defrosting Fluids
AS14101	Bearing, Plain, Self-Lubricating, Self-Aligning, Low Speed, Narrow, Grooved Outer Ring, -65°F to +325°F
AS81820	Bearings, Plain, Self-Aligning, Self-Lubricating, Low Speed Oscillation
AS81934/1	Bearing, Sleeve, Plain, Self-Lubricating, 325°F
AS81934/2	Bearing, Sleeve, Flanged, Self-Lubricating, 325°F
AMS 2417	Plating, Zinc-Nickel Alloy
AMS-QQ-P-35	Passivation Treatments for Corrosion Resistant Steel
AMS-QQ-P-416	Plating, Cadmium (Electrodeposited)

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM F 25	Standard Test Method for Sizing and Counting Airborne Particulate Contamination in Clean Rooms and Other Dust-Controlled Areas Designed for Electronic and Similar Applications
ASTM F 50	Standard Practice for Continuous Sizing and Counting of Airborne Particles in Dust-Controlled Areas and Clean Rooms Using Instruments Capable of Detecting Single Sub-Micrometre and Larger Particles
ASTM A 380	Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
ASTM C 794	Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
ASTM A 967	Standard Specification for Chemical Passivation of Stainless Steel Parts
ASTM D 3951	Standard Practice for Commercial Packaging

2.3 ANSI/ASME Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002 or ASME, 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900.

ANSI/ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)
ANSI/ASME Y14.100	Engineering Drawing Practices

2.4 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 or http://assist.daps.dla.mil/quicksearch/

MIL-STD-129	Standard Practice Military Marking for Shipment and Storage
MIL-DTL-197	Packaging of Bearings, Anti-Friction, Associated Parts and Sub-Assemblies
MIL-HDBK-1599	Bearings, Control System Components and Associated Hardware Used in the Design and Construction of Aerospace Mechanical Systems and Subsystems
MIL-STD-2073-1	Standard Practice for Military Packaging
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys
MIL- PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft; Missile and Ordnance
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-4, JP-5 and JP-5/JP-8ST
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-PRF-83282	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Metric, NATO Code Number H-537
MIL-A-8625	Anodic Coatings, For Aluminum and Aluminum Alloys

3. REQUIREMENTS:

3.1 Aerospace Standard (AS) Sheets:

The individual item requirements shall be as specified herein and in accordance with the applicable AS sheets. In the event of any conflict between the requirements of this standard and the AS sheet, the latter shall govern.

3.2 Qualification:

The bearings furnished under this standard shall be products which are authorized by the qualifying activity for listing on the applicable Qualified Products List (QPL-AS81934) at the time of award of contract (see 4.3, 6.3, and 6.3.1).

3.2.1 Product Change: Any change in product design, description, materials, processing procedures or plant location shall be reported to the qualifying activity and may require requalification of the product to an extent determined by the qualifying activity. Any other specific changes, which must be brought to the qualifying activity's attention, shall be identified in the qualification notification letter.

3.2.2 Product Manufacture: Except for the bonding operations, the manufacturer is permitted to subcontract manufacturing operations without violating the requirements of 3.2.1. The bonding operations shall be performed in the plant listed on the Qualified Products List. Manufacture of the self-lubricating liner material may also be subcontracted. Any change in (1) the liner manufacturer, (2) the liner manufacturing procedures, or (3) the materials used in manufacture of the liner will require requalification to an extent determined by the qualifying activity. The manufacturer is responsible for meeting all requirements of the standard and for the quality of the end product, whether it is manufactured totally in-house or some of the operations are performed by a subcontractor. Inherent in the responsibility for the end product is the responsibility to verify that the subcontractor's processes meet standard requirements.

3.3 Materials:

Material for the sleeve and liner shall conform to the applicable AS sheet. PTFE shall be included in the liner in such a manner that the bearing will conform to all requirements of this standard.

3.3.1 Corrosion Resistant Steel Finishes: Corrosion resistant steel (CRES) sleeve bearings shall be finished by cadmium plating, zinc-nickel plating, or passivating in accordance with the finish option in the part number.

3.3.1.1 Cadmium or Zinc-Nickel Plating: When required by the part number, plating of the outside diameter of CRES sleeve bearings shall be in accordance with AMS-QQ-P-416, Type II, Class 2, or AMS 2417, Type 2, and the applicable AS sheet. The 23-hour bake time of the plating specification shall be waived to prevent over-curing of the liner adhesive. Hydrogen embrittlement testing is not required. Dimensions in AS81934/1 and AS81934/2 apply.

3.3.1.2 Passivation: When required by the part number, exposed metallic surfaces of unplated CRES sleeve bearings shall be passivated per AMS-QQ-P-35 or ASTM A 967 after all metal removal operations, regrinding inclusive, have been completed. Passivation may be performed before or after bonding, at the bearing manufacturer's option.

3.3.2 Aluminum Finishes: Aluminum sleeve bearings shall be anodized per MIL-A-8625, Type I or II or chemical film treated per MIL-C-5541.

3.4 Design:

Bearing design shall conform to that shown on AS81934/1 and AS81934/2.

3.5 Construction:

The liner shall be so secured that all relative motion will be between the liner and the shaft. Except as otherwise specified on the applicable AS sheet, the details of the design shall be optional.

3.5.1 Dimensions and Tolerances: Dimensions and tolerances shall be as specified on the applicable AS sheet. Dimensions not shown shall be at the option of the manufacturer.

3.5.2 Surface Texture: The surface texture shall be in accordance with the applicable AS sheet and ANSI/ASME B46.1. Bearings shall be free of any surface defects, which may be detrimental to satisfactory installation, performance or bearing life as defined in this standard. Unless otherwise specified, liner surfaces are exempt from surface texture measurements.

3.5.3 Lubrication: Initial grease or oil lubrication by the manufacturer will not be permitted.

3.5.4 PTFE Liner Condition:

3.5.4.1 Visual Examination: The visual appearance of the bonded liner shall exhibit a degree of workmanship consistent with proper manufacturing process controls, as checked per 4.6.5.1. The liner shall be uniform in texture and shall contain no imbedded contaminants. The liner setback shall meet the applicable drawing requirements. There shall be no separation or lifting of the liner at any of the edges. Unraveling and fraying is not permitted outside the setback area. Molded liners shall not contain embedded contaminants, cracks, or bubbles.

3.5.4.2 Bond Integrity and Peel Strength: When tested in accordance with 4.6.5.2, the liner shall be tightly adherent to the metallic substrate over at least 90% of the contact area and shall exhibit an average peel strength of 2 lb per inch or greater. The adhesive remaining on the metal substrate shall have no void or unbonded area which cannot be included within a circumscribing circle with a diameter equal to 25% of the lined sleeve length or 0.25 inch, whichever is smaller.

3.5.4.2.1 Processing Controls: All fabrication of the PTFE liner involving application or mixing of adhesive, and all liner bonding procedures involving application of adhesive, shall be conducted in a controlled area.

3.5.4.2.1.1 Controlled Area: The controlled area shall be maintained at a temperature of 75 °F ± 10 °F with a maximum relative humidity of 75%. The enclosed atmosphere of the work area shall be well ventilated and maintained so that the particle count is 2500 maximum 5 µm or larger when measured per ASTM F 25 or ASTM F 50. The particle count measurement shall be performed annually (minimum). There shall be no eating or smoking in the controlled area and no process which produces uncontrolled spray, dust, fumes, or particulate matter.

3.5.4.3 Liner Peelability: Each manufacturer shall establish during qualification testing whether the liner is peelable or non-peelable. If peelable, the manufacturer shall determine the mean and standard deviation peel strength values for the liner based upon a minimum of six peel strength tests conducted in accordance with 4.6.5.2. This data shall be recorded in the qualification test report. A liner originally qualified as peelable shall remain peelable in production. A liner originally qualified as non-peelable shall remain non-peelable in production.

3.6 Performance:

3.6.1 Radial Static Limit Load: After the radial static limit load listed in Table 1 has been applied as specified in 4.6.1, the permanent set shall not exceed 0.002 inch.

TABLE 1 - Load Values

Part No.	Radial Static Limit Load (lb)	Oscillation Load (lb)	After Test Breakaway Torque (in-lb max)
M81934/1-08A012	6,900	6,300	79
M81934/1-08C012	10,800	6,300	79
M81934/1-16A016	20,000	16,500	410
M81934/1-16C016	31,400	16,500	410
M81934/1-24A016	30,000	22,500	840
M81934/1-24C016	47,100	22,500	840

3.6.2 Oscillation Under Radial Load: The total liner wear of the bearing shall not exceed 0.0035 inch after 1000 cycles, 0.0040 inch after 5000 cycles, and 0.0045 inch after 25,000 cycles when tested at room temperature in accordance with 4.6.2. Visual examination of the liner after test shall indicate no loss of bonding to the metal substrate in the loaded area.

3.6.3 Fluid Compatibility: When tested in accordance with 4.6.3, the bearings shall be compatible with the fluids listed in 4.6.3 and the total liner wear shall not exceed 0.0060 inch. Visual examination of the liner after test shall indicate no loss of bonding to the metal substrate in the loaded area.

3.6.4 High Temperature: When tested in accordance with 4.6.4, under the dynamic load specified in Table 1, the total liner wear shall not exceed 0.0060 inch. Visual examination of the liner after test shall indicate no loss of bonding to the metal substrate in the loaded area.

3.7 Interchangeability:

All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other and with respect to installation and performance. The drawing number requirements of ANSI/ASME Y14.100 shall govern documentation of and changes in the manufacturer's part numbers.

3.8 Identification of Product:

Each bearing shall be permanently and legibly marked with the manufacturer's CAGE code, manufacturer's lot number, and Aerospace Standard part number as a minimum. Any additional marking is optional. Metal impression stamping is prohibited.

3.9 Workmanship:

3.9.1 General Requirements: All workmanship shall be such as to result in a first quality bearing which meets the requirements of this standard. The bearing shall be free from defects which may affect its durability and serviceability.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. The supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the qualifying activity. The qualifying activity reserves the right to perform any of the inspections set forth in this standard where such inspections are deemed necessary to ensure product and/or services conform to prescribed requirements.

4.1.1 Responsibility for Compliance: All items shall meet all requirements of Sections 3 and 5. The inspection set forth in this standard shall become a part of the supplier's overall inspection system or quality program. The absence of any inspection requirements in the standard shall not relieve the supplier of the responsibility of ensuring that all products or services submitted to the qualifying activity for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the customer to accept defective material.

4.1.2 Qualification Test Records: The manufacturer shall maintain a record showing quantitative results for all tests required by this standard for seven years or as contractually obligated. This record shall be available to the purchaser and shall be signed by an authorized representative of the manufacturer or the testing laboratory, as applicable.

4.2 Classification of Inspections:

The inspection requirements specified herein are classified as follows:

a. Qualification inspection (4.3).

b. Quality conformance inspection (4.4).

4.3 Qualification Inspection:

4.3.1 Sampling Instructions: Qualification test samples shall consist of 38 bearings conforming to M81934/1-08A012 and 5 bearings conforming to M81934/1-08C012, plus 15 bearings of each of the additional bore diameters, widths and housing materials specified below for which qualification is desired. All bearings necessary for tests specified herein shall be furnished by the manufacturer. Samples shall be identified as required and forwarded to the activity designated in the letter of authorization (see 6.3 and 6.3.1).

When approved: M81934/1-08C012 will qualify M81934/1&/2-04C thru -09C
M81934/1-08A012 will qualify M81934/1&/2-04A thru -09A
M81934/1-16C016 will qualify M81934/1&/2-10C thru -18C
M81934/1-16A016 will qualify M81934/1&/2-10A thru -18A
M81934/1-24C016 will qualify M81934/1&/2-20C thru -32C
M81934/1-24A016 will qualify M81934/1&/2-20A thru -32A

4.3.2 Certified Test Report: The manufacturer shall furnish a certified test report showing that the manufacturer's product satisfactorily conforms to this standard (see 6.3.1). The test report shall include, as a minimum, actual results of the tests specified herein. When the report is submitted, it shall be accompanied by a dated drawing which completely describes the manufacturer's product by specifying all dimensions and tolerances, outer race material, coating or plating, and heat treatment. The manufacturer's part number for each size shall be included on the drawing.

4.3.3 Tests: Qualification tests shall include all the examinations and tests of this standard. The minimum number of samples per test shall be in accordance with Table 2.

TABLE 2 - Qualification Test Samples

Examination and Tests	Paragraph Number	Samples to be Tested
Examination of product	4.5.1	5
Preparation for delivery	4.5.2	5
Radial static limit load 1/	4.6.1	3
Oscillation under radial load 1/	4.6.2	3
Fluid compatibility 1/	4.6.3	3 for each fluid (M81934/1-08A012 only)
High temperature 2/	4.6.4	3 each (M81934/1-08A012 & M81934/1-08C012)
Bond integrity	4.6.5.2	1
Peel strength 1/ 3/	4.6.5.2	6

1/ These tests are not required if the following conditions are all satisfied and certified:

a. The bearing manufacturer is qualified to AS81820 for sizes MS14101 -5, -8, and -12.
b. The liner materials and bonding procedures used in these sleeve bearings are the same as qualified to AS81820.

2/ The tests with M81934/1-08C012 are not required if the following conditions are all satisfied and certified:

If the bearing manufacturer is qualified to AS81820 for sizes MS14101-5, -8, and -12 and the liner materials and bonding procedures used in these sleeve bearings are the same as qualified to AS81820.

3/ Only for peelable liners.

4.3.4 Retention of Qualification: The continued listing of a product on the Qualified Products List is dependent upon a periodic verification of the manufacturer's continued compliance with the requirements of this standard and with standardization regulations. As part of that verification process, each manufacturer must complete DD Form 1718 during October of each even numbered year. This form, supplied by the qualifying activity, is to be signed by a responsible official of management and sent to the Naval Air Systems Command, Code 435400A, 48110 Shaw Road Unit 5, Patuxent River, MD 20670-1906.

4.3.5 Periodic Retest for Retention of Qualification: In addition to the certification requirement of 4.3.4, each manufacturer shall retest a sample of bearings from recent production at five year intervals beginning in 1998. The tests to be performed shall be as follows:

a. 4.6.2 Oscillation Under Radial Load.
b. 4.6.3 Fluid Compatibility, using MIL-PRF-83282 Hydraulic Fluid.
c. 4.6.4 High Temperature.
d. 4.6.5 PTFE Liner Condition.

The test bearings shall be a single size from normal production. The bearings shall be M81934/1-08A012 or M81934/1-08C012, at the manufacturer's option, with the exception of (c), which shall include three each of M81934/1-08A012 and M81934/1-08C012 bearings. Three samples each of test (a) and (b), and six samples of test (c), and seven samples of test (d) are required. The test data shall be assembled in report form, certified by the Chief Engineer or other responsible official of management, and forwarded to the Qualifying Activity in October of the appropriate year. If the bearing manufacturer is qualified to AS81820 for sizes MS14101-5, -8, and -12, and the liner material and bonding procedures used in these sleeve bearings are the same as qualified to AS81820, the periodic retest for retention of qualification requirements of AS81820 will satisfy the requirements of this paragraph.

4.4 Quality Conformance:

The quality conformance inspections of the bearings shall consist of the examinations and tests of Table 3 to determine conformance of the bearings to the requirements of this standard.

TABLE 3 - Quality Conformance Inspections

Examination or Test	Major Characteristics	Minor Characteristics	Special Inspection Plan	Requirement Paragraph	Test Paragraph
(a) Dimensions / MS Ref.					
Bore "B"	X			3.5.1	4.5.1
Sleeve Diameter "D"	X			3.5.1	4.5.1
Sleeve Diameter "H" 1/		X		3.5.1	4.5.1
Flange Thickness "F" 1/	X			3.5.1	4.5.1
Length "L"		X		3.5.1	4.5.1
Concentricity	X			3.5.1	4.5.1
Chamfers		X		3.5.1	4.5.1
Liner Setbacks		X		3.5.1	4.5.1
Undercut Features 1/		X		3.5.1	4.5.1
(b) Identification of Product		X		3.8	4.5.1
(c) Workmanship		X		3.9	4.5.1
(d) Preparation for Delivery		X			4.5.2
(e) PTFE Liner Condition			Destructive Inspection	3.5.4	4.6.5

1/ Inspection applies only to AS81934/2 parts.

4.4.1 Inspection Lot: The inspection lot shall consist of finished bearings, having a single part number, manufactured according to same procedures as the parts originally qualified and produced as one continuous run or order or portion thereof.

4.4.2 Sampling:

4.4.2.1 Sample for Quality Conformance Tests (a) through (d): The sample bearings shall be selected at random from each inspection lot in accordance with Table 4. If no defect is found in the sample lot, the lot shall be accepted for these tests. If any defects are found in the sample, the entire lot shall be 100% inspected for each defective characteristic found, and all defective parts shall be removed from the lot.

TABLE 4 - Sampling Plan for Quality Conformance Inspections Except Destructive Inspections
Zero-Based Acceptance Plan (C=0)

Lot Size	Major Characteristics	Minor Characteristics
1-2	A	A
3-8	A	3
9-12	A	3
13-15	13	3
16-25	13	3
26-50	13	5
51-90	13	6
91-150	13	7
151-280	20	10
281-500	29	11
501-1200	34	15
1201-1249	42	18
1250-3200	42	18
3201-10,000	50	22

4.4.2.2 Sample for Quality Conformance Test (e): The sample bearings shall be selected at random from each inspection lot in accordance with Table 5. At the bearing manufacturer's option, the sample bearings for destructive inspections may be selected at random from the non-repairable defective parts rejected from the inspection lot during quality conformance tests (a) through (d). If no defect is found in the sample the lot shall be accepted for these tests. A lot which was rejected under Normal Inspection of Table 5 shall be reinspected under Tightened Inspection of Table 5. If a defect is found in the Tightened Inspection sample, the entire lot shall be rejected and shall not be offered for sale or acceptance under this standard.

TABLE 5 - Destructive Inspection Sampling Plan
Zero-Based Acceptance Plan (C=0)

Lot Size	Normal Inspection			Tightened Inspection		
	Sample Size	Accept	Reject	Sample Size	Accept	Reject
2-50	2	0	1	4	0	1
51-500	3	0	1	6	0	1
501-5000	5	0	1	10	0	1
5001-50000	8	0	1	16	0	1

4.4.3 Quality Assurance Certification: For each inspection lot the manufacturer shall maintain and supply to the customer upon demand:

a. Certified copies of all records of quality conformance tests specified in 4.4 and the purchase order.

b. Certification that the materials, manufacturing procedures, and processes used in producing the bearings are the same as those of the bearings originally qualified.

These records and certifications shall be kept for seven years or as contractually obligated.

4.4.4 Resubmitted Inspection Lots: Where the original acceptance number was zero, a sample size represented by the next higher sample size code letter shall be selected. A resubmitted inspection lot shall be inspected using tightened inspection. When an inspection lot is resubmitted, full particulars concerning the cause of previous rejection and the action taken to correct the defects found in the inspection lot, shall be furnished by the contractor to the procuring activity.

4.5 Examinations:

4.5.1 Examination of Product: The bearings shall be examined to determine conformance to the requirements of this standard and the applicable AS sheet for material, dimensions, finish, identification of product, workmanship, and requirements not covered by tests.

4.5.2 Preparation for Delivery: Preservation, packaging, packing, and marking shall be inspected to determine conformance to Section 5.

4.6 Test Methods:

Unless otherwise specified, all tests shall be conducted at room temperature.

4.6.1 Radial Static Limit Load: The bearings shall be installed in a test fixture as shown on Figure 1, using 0.0001 to 0.0011 (CRES) or 0.0001 to 0.0016 (aluminum) inch interference fit with the housing and a 0.000 to 0.001-inch loose fit with the pin. A preload of 4 to 6% of the radial static limit load shall be applied to the bearing for 3 minutes, and then the displacement measuring device should be set at zero. The load shall then be increased at the rate of 1% of the specified load per second until it equals the radial static limit load listed in Table 1. The load shall then be reduced at the same rate to the preload value. The permanent set shall be the reading at preload (see 3.6.1).

4.6.2 Oscillation Under Radial Load: The bearing shall be installed in a steel housing, using a 0.0001 to 0.0011 (CRES) or 0.0001 to 0.0016 (aluminum) inch interference fit with the housing and a 0.000 to 0.001-inch loose fit with the pin. The bearing shall be so installed as to place the pin in double shear. A dial indicator or electronic pickup shall be so mounted that any radial movement of the pin or the bore of the bearing with respect to the bearing outside diameter can be measured. The oscillation load specified in Table 1 shall be applied and held statically for 15 minutes. At the end of this time, the indicating device shall be set at zero and the oscillating test shall be started. Wear readings shall include the wear from the first cycle on. The test shall be run in such a manner that the pin is oscillated at ±25° from the zero position (50° included angle, or 100° total travel per cycle) a minimum of 10 cpm for 25,000 cycles. One cycle shall consist of rotation from 0° to +25°, return through 0° to -25° and return to 0°. Sufficient readings during the test shall be recorded to plot wear in thousandths of an inch versus life in cycles. Upon completion of the test, the loaded rotational breakaway torque shall be as specified in Table 1 and liner wear and liner bond shall be as specified in 3.6.2.

4.6.3 Fluid Compatibility: 18 bearings conforming to M81934/1-08A012 (3 for each fluid) shall be immersed for 24 hours in each of the following fluids at 160 °F ± 5 °F (71 °C ± 3 °C), except for (b) which shall be at 110 °F ± 5 °F (43 °C ± 3 °C):

a. Skydrol 500B hydraulic fluid

b. MIL-DTL-5624, turbine fuel grades JP-4 or JP-5

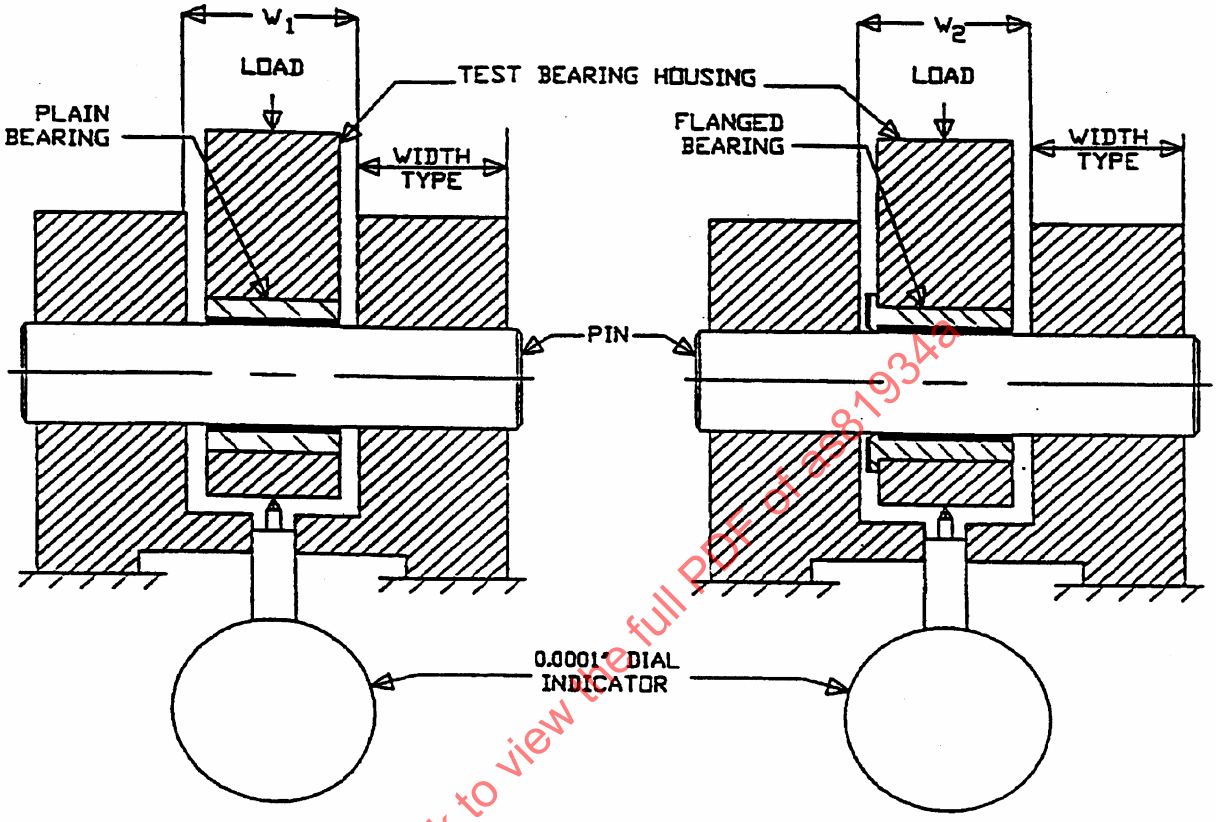
c. MIL-PRF-7808 lubricating oil

d. MIL- PRF-5606 hydraulic oil

e. AS8243 anti-icing fluid

f. MIL-PRF-83282 hydraulic fluid

Within 1/2 hour after removal from the test fluid the bearing shall be tested in accordance with 3.6.3 and 4.6.2. The load for (e) shall be 75% of the oscillation load specified in Table 1.



Pin: Diameter = Bmin + 0.001"/-0.002"
Material = Steel 50 Rc min
Finish = 8 Ra max
Note: Taper one end 0.5" min length, tapered end to extend beyond support housing when assembled

Test Bearing Housing: Bore = D + (0.0006" to 0.0011")
Width = L max + 0.002" - 0.000"
Length = 2D min

Support Housing: Bore = Pin dia max + (0.0002" to 0.0027")
Min support width = L nominal
Length = (2) (pin dia min)
W1 = L + (0.025" to 0.030")
W2 = L + F + (0.025" to 0.030")

(L, F, and D may be obtained from the appropriate specification sheet)

FIGURE 1 - Radial Test Fixture

4.6.4 High Temperature: Three bearings conforming to M81934/1-08A012 and three bearings conforming to M81934/1-08C012 shall be subjected to the test of 4.6.2, with the bearings heated in such a way that the pin/liner interface is maintained at a temperature of 325 °F + 10 °F/-0 °F (163 °C + 6 °C/-0 °C). Successful testing at temperatures higher than 335°F is not cause for rejection. The load shall be 100% of the oscillation load specified in Table 1 (see 3.6.4).

4.6.5 PTFE Liner Condition:

4.6.5.1 Visual Examination: Visually examine the exposed liner surface for conformance to the applicable requirements of 3.5.4.1, 3.9 and the AS sheet.

4.6.5.2 Bond Integrity and Peel Strength: Peel the liner away from the metal substrate and evaluate the peel strength and adhesive bond appearance per 3.5.4.2. A blade or scribe may be used to initiate the peel. To determine peel strength, the liner shall be attached to a calibrated spring scale or tension testing machine of the type described in ASTM C 794 and the liner peeled back from the substrate at 140° ± 40° angle to the bond surface at a speed of 0.5 to 1 inch per minute (see Figure 2). The average peel strength value shall be recorded and included in the test report. Where possible, the peel shall be conducted on the entire width of the bonded liner. When the peel is conducted on the entire width of the sleeve, the width for calculating peel strength in pounds per inch shall be the machined width minus 0.050 inch to account for chamfers and edge effects. At the manufacturer's option, or when peeling of the full sleeve width is impractical, the liner may be cut through to the metal substrate to form a peel sample with a minimum width of 0.500 inch. This peel sample may be cut either parallel to or perpendicular to the sleeve side face. This sample shall be peeled as previously described. The peel strength test shall be waived for the -04 through -09 size bearings, but the liner shall be peeled by hand to permit visual examination of the bond line for voids.

Following liner peel, the adhesive bond appearance shall be evaluated to determine the location and size of any voids or unbonded areas as specified in 3.5.4.2. In the event the liner cannot be removed without employing chipping, scraping, or abrasive techniques, the liner shall be considered to be properly bonded and free of voids and shall be classed as nonpeelable.

5. PACKAGING:

5.1 Preservation:

Preservation shall be in accordance with the requirements of MIL-DTL-197.